NAME…….. INDEX NO…….....

233/3 CANDIDATE'S SIGN……..……..……..
CHEMISTRY
PAPER 3 DATE……..……
(PRACTICAL)
JULY/AUGUST, 2014
TIME: 2¼ HOURS

KIHARU/KAHURO DISTRICT JOINT EXAMINATION – 2014

Kenya Certificate of Secondary Education
CHEMISTRY
PAPER 3
(PRACTICAL)
TIME: 2¼ HOURS

INSTRUCTIONS TO CANDIDATES:

- Answer **ALL** questions in the spaces provided for each question.
- You are **NOT** allowed to start working with the apparatus for the first 15 minutes of 2¼ hours allocated. This time enables you to read the questions and confirm all requirements have been provided to you.
- Electronic calculators may be used.
- Show all your working clearly.

FOR EXAMINER'S USE ONLY:

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1	14	
2	10	
3	16	
TOTAL SCORE	40	

*This paper consists of **6** printed pages. Candidates should check to ascertain that all papers are printed as indicated and that no questions are missing.*

1. You are provided with:
- A dibasic acid solution P.
- 0.5M sodium hydroxide solution Q.
- Magnesium ribbon solid R.

You are required to determine the concentration of the dibasic acid in moles per litre.

PROCEDURE I

Measure 50cm³ of solution P using a 100ml measuring cylinder and place it in a 100ml beaker. Stir gently with a thermometer and record its steady temperature, T_1.
Add all of solid R at once. Continue stirring and note the highest temperature reached, T_2.
KEEP THE RESULTING SOLUTION FOR USE IN PROCEDURE II.

(a) **Table I** . (1½mks)

Final temperature, T_2 (°C)	
Initial temperature, T_1 (°C)	

(b) Determine the change in temperature, ΔT. (1mk)

(c) Calculate the:

(i) heat change for the reaction
Specific heat capacity = $4.2Jg^{-1}K^{-1}$, density of solution = $1\,gcm^{-3}$. (1mk)

(ii) moles of the dibasic acid that reacted with magnesium, given that the enthalpy change of this reaction is -323kJ mol^{-1}. (½mk)

PROCEDURE II

Place all the solution retained in procedure I into a clean 100ml measuring cylinder. Add distilled water up to the 100ml mark. Transfer the resulting solution into a clean 250ml beaker and label the solution in the beaker as solution S.
Fill the burette with solution S.
Using a pipette, transfer 25cm³ of solution Q into a clean conical flask.
Add 2-3 drops of phenolphthalein indicator and titrate with solution S.
Record in the table below.

(d) **Table II**. (4mks)

	I	II	III
Final burette reading			
Initial burette reading			
Volume of solution S (cm³)			

(e) Calculate the:

(i) Average volume of S used. (1mk)

(ii) Moles of sodium hydroxide in the pipette volume of Q. (1mk)

(iii) Moles of the dibasic acid found in the average volume of S. (1mk)

(iv) Moles of the dibasic acid in 100cm³ of solution S. (1mk)

(v) Moles of the dibasic acid in 50cm³ of solution P before reaction with magnesium. (1mk)

(vi) Concentration of the dibasic acid solution P in moles per litre. (1mk)

2. You are provided with:
- 2.0M hydrochloric acid solution V.
- 0.4M sodium thiosulphate, solution W.

You are required to determine the rate of reaction between hydrochloric acid and sodium thiosulphate at different concentrations of sodium thiosulphate.

PROCEDURE

Using a 100ml measuring cylinder, measure 10cm³ of solution W, and dilute it to the 50ml mark with distilled water. Transfers into a 250ml conical flask. Make a thick biro pen mark on the filter paper provided. Measure 5cm³ of solution V using a 10ml measuring cylinder. Add this to the diluted solution W in the conical flask, START THE STOP-WATCH IMMEDIATELY, swirl the contents once and place it on the filter paper with a mark on it. Observe the pencil mark through the solution and record the time taken (t) in seconds for the mark to just disappear.

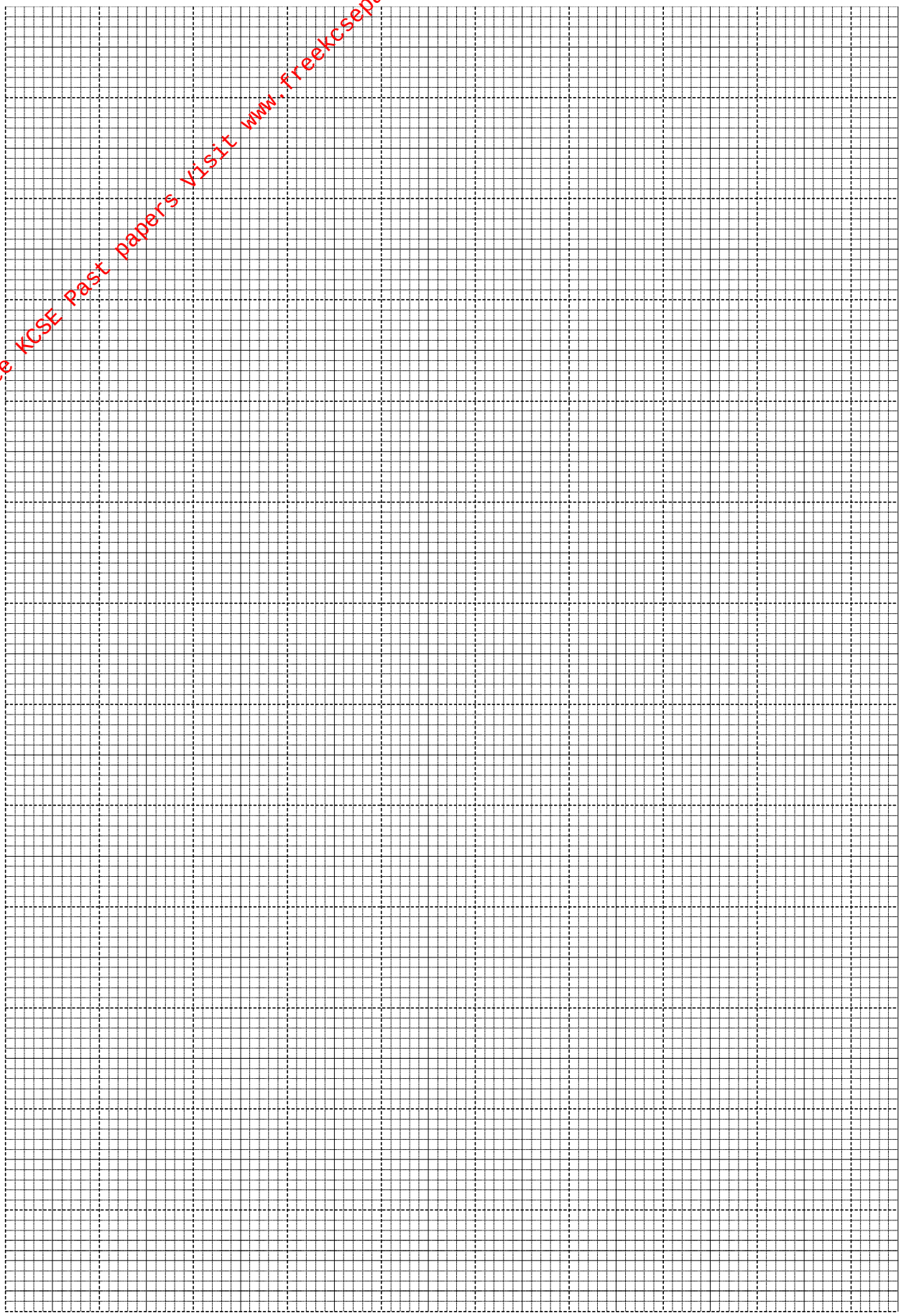
Repeat these procedures using 20cm³, 30cm³, 40cm³ and 50cm³ of solution W, each time dilute the solution to 50cm³ with distilled water.

Fill and complete the table below.

(a) **Table III**. (5mks)

Volume of W (cm^3)	Volume of water (cm^3)	Volume of V(cm^3)	Concentration of $Na_2S_2O_3$ (M)	Time (s)	Reciprocal of time (s^{-1})
10	40	5			
20	30	5			
30	20	5			
40	10	5			
50	0	5			

(b) On the grid provided, plot a graph of concentration of sodium thiosulphate, $Na_2S_2O_3$ against the rate of reaction (Reciprocal of time). (3mks)



(c) From your graph, determine the time it would take for 35cm³ of solution W containing 15cm³ of water to make the pencil mark just disappear. (1½mks)

(d) In terms of rate of reaction, explain the shape of your graph. (½mk)

3. You're provided with solid Y and X. Carry out the following tests and write your observations and inferences in the spaces provided.

(a) Place all solid Y into a boiling tube. Add about 15cm³ of distilled water into the solid and then shake the contents. Filter the mixture into clean conical flask. Preserve both residues and filtrate.

(i)

Observation	Inference
(1mk)	

(ii) To about 2cm³ of the filtrate obtained, add ammonia solution drop by drop until excess.

Observation	Inference
(1mk)	(1mk)

(iii) To another 2cm³ of filtrate add 1cm³ of lead (II) nitrate solution followed by 1cm³ of dilute nitric acid.

Observation	Inference
(1mk)	(1mk)

(iv) Use a spatula to place the residue into a clean test tube. To this residue in a test tube add about 1cm³ of dilute nitric acid. Test any gas produced using lime water on a glass rod.

Observation	Inference
(1mk)	(1mk)

(b) (i) Scoop a spatula end full of solid X with metallic spatula and burn it on a non-luminous flame.

Observation	Inference
(1mk)	(1mk)

(ii) Place a spatula end full of solid X into a test tube, add about 10cm³ of distilled water and shake the contents. Divide the resulting mixture into three portions.

Observation	Inference
(1mk)	(1mk)

(iii) To the first portion add two drops of acidified potassium manganate (VII).

Observation	Inference
(1mk)	(1mk)

(iv) Place blue and red litmus paper into the 2nd portion.

Observation	Inference
(1mk)	(1mk)

(v) To the third portion add a quarter spatula end full of solid sodium hydrogen carbonate.

Observation	Inference
(1mk)	(1mk)